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Research Article

Preoperative predictors of morbidity in patients with perforation peritonitis: Can early identification prevent mortality?

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Abstract

Introduction: Perforation peritonitis is one of the most frequently encountered surgical emergencies in tropical countries like India and mostly affects young men in their prime of life. In the majority of the cases, presentation to the hospital is late with generalized peritonitis and varying degrees of septicemia. It is therefore necessary to recognize patients at risk preoperatively and prepare for an aggressive management strategy. The present study was thus planned to assess the clinical factors that could predict morbidity and mortality preoperatively in people with perforated peritonitis.

Materials and methods: 100 adult patients above 14 years of age with perforated peritonitis who underwent emergency laparotomy were evaluated. Data on demographics, comorbidities, vital signs, deranged biochemical parameters, delay in presentation to the hospital, and personal medical history were collected and analyzed for preoperative predictors.

Results: Postoperative morbidity and mortality were the key results. The findings revealed that a number of preoperative predictors like advanced age, delay in presentation to the tertiary care center, medical co-morbidities an elevated white blood cell count, and a protracted preoperative hospital stay were strongly linked with greater morbidity and mortality. Among the pre-existing comorbidities, COPD accounted for most of the deaths after surgery.

Conclusion: Early detection of preoperative predictors can assist clinicians in risk stratification by enhancing preoperative care and help in a well-directed therapy for patients who are more likely to experience postoperative difficulties and thus lower morbidity and death. A proper referral mechanism and early transportation along with adequate health education particularly for rural populations can reduce the morbidity and mortality in such patients.

Introduction

Perforation peritonitis is the most common surgical emergency in India [1]. Perforation can occur anywhere in the gastrointestinal tract starting from the oesophagus to the rectum. The common causes of perforation peritonitis are duodenal ulcer (~50%) followed by typhoid (20%), traumatic (14.5%), appendicular (7.4%), and tubercular (3.1%) cases. Males are three times more commonly affected than females. Peak incidence occurs usually in the 2nd and 3rd decades of life [2].

Gastrointestinal perforation in our region generally occurs as a result of chronic inflammation due to Helicobacter pylori, overuse of NSAID(s) or aspirin, stress, excessive smoking, alcohol or coffee consumption, typhoid fever, and tubercular peritonitis. Because of the high incidence of typhoid illness and the increased prevalence of tuberculosis, both ileal and jejunal perforation are typically more prevalent in India [3].

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According to The Surviving Sepsis Campaign, there is evidence that patients with perforation are septic at admission and may benefit from a perioperative care plan with early source control and early goal-directed therapy [4]. Various indices like Boey score, Mannheim peritonitis index, etc are available to predict morbidity and mortality due to perforation peritonitis. Other indices also take into account the intraoperative and postoperative statuses, whereas these indices are time-consuming and challenging to apply.

The improvement in mortality from general peritonitis is not only due to advances in surgical skills and antibiotics but also due to early recognition of the disease [5]. It is a known fact and proven by literature that patients presenting late have an increased incidence of morbidity, mortality and thus complicating the task of the doctor providing care to these patients. There are numerous other risk factors that affect outcomes like advancing age and the presence of comorbid conditions like diabetes mellitus, tuberculosis, HIV, COPD, and cardiac conditions like coronary artery diseases, CHF, hypertension, and deranged renal function [6,7].

Age is the next most common risk factor in predicting outcomes in case of perforation peritonitis. Associated co-morbidities are common in advancing age and also the physiological reserves of organ systems are poor leading to decreased capability of the body to deal with stressful events like peritonitis [2,8].

Delay in surgery is another risk factor that is associated with poor patient outcomes. It is universally accepted that once the diagnosis of perforation peritonitis is made, the patient should be operated on as early as possible. But at the same time, the patient should be adequately resuscitated before taking him to surgery. It has been seen that patients who are resuscitated for at least two hours before surgery have a better outcome compared to those immediately posted for surgery [9,10].

Preoperative vital parameters of the patient are important in assessing the general condition of the patient. Patients presenting with shock characterized by tachycardia, low blood pressure, and tachypnoea are known to have worse prognosis post-operatively [2,9].

Blood investigations in the form of haemoglobin levels, Total Leucocyte Count (TLC), Renal Function Test (RFT) and serum electrolytes levels form an important part of the preoperative workup of patients. Abnormal high or low TLC values are suggestive of septicemia. Similarly, deranged renal function tests and serum electrolytes are associated with poor postoperative outcomes [11,12].

The present study was carried out with the aim to identify and assess preoperative clinical predictors in patients presenting with perforated peritonitis which will determine the morbidity and mortality in such patients.

Materials and methods

After obtaining informed consent from the patient and approval from the Institutional Ethics Committee (Approval number:- PGIMS/IEC/2021/34) the present study was conducted in the Department of General Surgery, Pt. B. D. Sharma Post Graduate Institute of Medical Sciences, Rohtak over a period of one year from January 2021 to January 2022.

Type of study design

Prospective study.

A total of 100 diagnosed cases of perforations peritonitis were subjected to exploratory laparotomy.

Inclusion criteria

All patients of 14 years and above having peritonitis either due to traumatic and non-traumatic causes and who subsequently underwent exploratory laparotomy were included in the study.

Exclusion criteria

Patients presenting with either primary peritonitis or due to anastomotic dehiscence were excluded.Patients below 14 years of age were also excluded. Patients who refused to undergo the surgery and who Left against Medical Advice (LAMA) were not included in the study.

Parameters like age, delay in presentation, vital statistics, biochemical parameters and comorbidities were evaluated to determine the outcome in terms of morbidity and mortality in such patients. The nominal and ordinal categorical data such as sex, associated diseases and delay in presentation to hospital were analyzed by Chi-square / Mann Whitney U test. To determine the independent factors causing the morbidity and mortality, all the factors having a p value of 0.05 or lower were included.

Software used

Statistical Package for Social Sciences (SPSS) version 24.0.

Observations and results

As shown in Table 1 out of 100 patients 84(84.0%) of the participants were male and 16(16.0%) of the participants were female.

As shown in Table 2, maximum number of patients in both sexes was between 21-40 years old. The mean age as per Table 2was 38.21 ± 17.94.

Table 1: Gender wise.

	Male	Female	Total
Gender wise distribution	84 (84%)	16(16%)	100(100%)

Table 2: Age wise.

Age	Survivors	Non Survivors	Total
< 50 years	68(88%)	10(12%)	78(78%)
> 50 years	16(62%)	6(38%)	22(22%)
Mean (S.D)	38.21 ± 17.94		

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As shown in Table 3, out of 100 patients of perforation peritonitis 26 patients presented after 72 hours from onset of sign and symptoms out of which 8 patients died (30%) leading to increased morbidity and mortality. Out of total death while patient who presented early constituted 74% of total patients out of which only 8 patients died that is 10% suggesting that late presenters carry a very high risk of increased in mortality.

As show in Table 4, out of 66 patients of early presenters 26 (39%) patients were discharged after 10 days while out of 18 patients who presented late 14(77%) were discharged from hospital after 10 days. Patients who suffered mortality had higher mean delay in presentation as compared to patients being discharged, (p < 0.05) which is suggestive that delay in presentation is a major determinant for patient outcome. Majority of patients presented within 3 days of the onset of symptoms. But still a significant number of patients presented after 3 days of their illness.

As shown in Table 5, the blood urea and creatinine level were observed as mean (SD) = 58.88 (28.60) and 1.24 (0.74) respectively. The mean TLC in the present study was 14218(6760.83). So, mortality is higher in patients with high TLC count, which is an indicator of septic load in patients.

As shown in Table 6, 32 out of 100 patients had comorbidities, majorly being COPD, since the majority of the patients were from rural background and low socioeconomic status and had an addiction to bidi smoking since early childhood.

As shown in Table 7, out of 16 deaths 11 deaths were associated with predisposing comorbidities like COPD, Hypertension, Pulmonary TB, Diabetes Mellitus with p value = < 0.05, suggesting a highly significant correlation between the morbidity and mortality of patient with perforation peritonitis.

Table 3: Comparison between delay in presentation and outcome.

Delay	Number of patient discharged	Death	Total	p - value
Within 72 hours	66	8	74	< 0.05
After 72 hours (delay in presentation)	18	8	26	

Table 4: Comparison between delay in presentation and hospital stay.

Time of Presentation	Total	Less than 10 days	More than or equal to 10 days
Within 72 Hours	66	40	26
After 72 Hours (Delay in Presentation)	18	4	14

Table 5: Patient characteristics (Biochemical parameters).

Parameters	Death	Discharge	p - value
UREA (mg/dl)	89.31 ± 48.58	53.08 ± 18.34	< 0.05
Serum Creatinine (mg/dL)	1.76 ± 0.76	1.14 ± 0.40	
TLC (/mm³)	16900.00 ± 11132.71	13707.86 ± 5520.14	

Table 6: Distribution of participants in term of comorbidities (n = 32).

Comorbidities	Frequency	Percentage
COPD	17	53.12
Hypertension	6	18.75
Pulmonary TB	5	15.62
Diabetes	4	12.90

Table 7: Association between comorbidities and outcome.

Comorbidities	Non-survivors	Survivor	Total	p - value
COPD	6(35.3%)	11(64.7%)	17	< 0.05
Hypertension	0(0.0%)	6(100.0%)	6	
Pulmonary TB	5(100.0%)	0(0.0%)	5	
Diabetes	0(0.0%)	4(100.0%)	4	

Discussion

Perforation peritonitis in tropical nations like India, is a common surgical emergency that primarily affects young, healthy men in their prime of life [1]. The majority of these patients report to the hospital with a generalised peritonitis that is well-established, purulent or faecal contamination with a variable degree of septicemia. The factors that affect mortality in sepsis should apply to perforation peritonitis as well, assuming that the patients with perforation are already septic when they are admitted. Prior to surgery, patients at risk must be identified and a comprehensive postoperative treatment plan must be made.

In the present study mortality was higher in older age groups. Also, there is increased presence of comorbid conditions in old age which itself is a known risk factor of increased mortality. Old age is also known to have delayed recovery as compared to younger age groups. These findings were in concordance with the studies conducted by Parwez, et al. [13] in which complications were most common in the elderly and so was mortality. Similarly, Paryani JJ, et al. [14] observed a higher mortality rate in the age group of less than 20years and more than 50 years. According to them, extremes of ages handle stressful conditions poorly leading to higher mortality in these ages.

The study conducted by Paryani JJ, et al. [14] stated that delayed presentation of more than 2 days from the time of origin of symptoms leads to septicemia and thus reduces the survival rate. They found delay in presentation as one of the most important factors predicting the outcome of a patient which is in concordance with present study. Parwez, et al. [13] observed that mortality increases significantly after 48 hours of presentation. Miidlaj, et al. [15] also observed that patients presenting late to emergency, that is 72 hours after symptoms had maximum mortality rate. In a recent study study conducted by Shaikh, et al. [16], only 15 (30%) patients presented within the first 24 hours of onset of symptoms and 19 patients (38%) presented within 24-72 hours and 16(32%) patients presented after 72 hours of onset of symptoms. Desa, et al. [17] observed that delay in presentation and consequent advanced septic shock was the most important determinant of mortality. Most of the studies done on perforation peritonitis have identified delay in presentation to hospital as the most consistent factor affecting patient outcome. This is because in absence of active medical intervention there is continuous outpouring of intestinal contents into the abdomen leading

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to further contamination of the body. With further delay there appears features of septicemia, dyselectrolytemia, Adult Respiratory Distress Syndrome (ARDS) and eventually septic shock [17,18].

Paryani JJ, et al. [14] which confirmed that hypotension and tachycardia lead to poor tissue perfusion leading to poor prognosis. This study also correlates with Parwez, et al. [13] who observed that those patients who remained hypotensive despite resuscitation had significant morbidity and mortality. In the present study the patients who could not survive had a mean respiratory rate of > 24/ min, which is well supported by R Singh, et al. [19] who recorded respiratory rate more than 20 per minute to be associated with higher mortality.

Very high or low values of total leucocyte count may be observed in patients of perforation peritonitis. This is in concordance with the study conducted by Paryani JJ, et al. [14] who observed that patients with total leucocyte count 12000/ dl have poor outcome after surgery. Also, R Singh, et al. [19] in their study mentioned that patients showed features of septic shock if total leucocyte count was < 4000/cu mm or > 12000/ cu mm. The present study was also comparable to Parwez, et al. [15] who recorded mean TLC of 11.5 ± 4.89 in perforation peritonitis patients.

The present study observed a significant association of deranged renal function tests and mortality of patients. Similar to present study Paryani JJ, et al. [14] observed that serum creatinine more than 1.5mg/dl had a severe effect on mortality. The present study is also well supported by Singh R, et al. [19] which mentioned preoperative blood urea, serum creatinine levels as independent predictors of mortality.

Miidlaj, et al. [15] observed that of the 25 comorbid patients, 10(45%) expired, which shows comorbid conditions like diabetes, hypertension, COPD. In the present study, 32 out of 100 patients had comorbidities, in which 17 patients (53.12%) had COPD and out of 16 deaths, 11 deaths were associated with predisposing comorbidities like COPD, Hypertension, Pulmonary TB, Diabetes suggesting a highly significant correlation between the morbidity and mortality of patient with perforation peritonitis ($p < 0.05$).

A significant correlation exists between preoperative predictors like extremes of age, delayed in presentation, deranged vitals and biochemical parameters etc with increased in morbidity and mortality hence nullifying the surgeon efforts for optimum post-operative care and results.

Conclusion

The current study revealed that comorbidities, preoperative complete blood counts, blood urea and serum creatinine levels along with the advanced age, delay in presentationare all independent predictors of morbidity and mortality in patients suffering from perforation peritonitis. Advancing age and delayed presentation significantly affects the overall outcome and is out of our control. Better results can definitely be achieved by the use of an appropriate referral mechanism, prompt transportation along with dedicated health education, especially for rural population. Early risk stratification and well-targeted medical aid in delivering the best postoperative care can lower morbidity and death in these patients.

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